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Thermochemical conversion of biomass residues to green fuels, electricity and heat

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Biomass enabling green fuels, electricity & heat

Initial Situation

Energy Policy

- Sustainable energy system & security of supply
- High-performing “low-carbon technologies”

Current situation

- High prices for biomass
- Economic pressure on plant operators

Target for the technology development:

- Fuel flexibility & product flexibility

Wood chips

Fuel samples TU WIEN

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Measures to take based on Paris agreement [1]

- **-50%** reduction of fossil CO_2-emissionen every 10 years.
- **+100%** increase of CO_2-free energy supply every 5 years.
- Active removal of carbon dioxide from atmosphere.

Research Question

- Which application of gasification technology from TU Wien would lead to the most reasonable contribution with respect to the energy policy of the European Union as well as the aims of the Paris agreement?

[1] Rockström J. in: Science, Nr. 6331, 2017

Vision for gasifiation technology

RESOURCES

Wood chips

Biogenic residues

Industrial waste materials

Homogenius municipal waste

Sewage sludge

Rising technological challenges for gasification and gas cleaning technology

PRODUCTS

Heat

Electricity

Hydrogen

Synthetic natural gas (SNG)

Liquid fuels & chemicals

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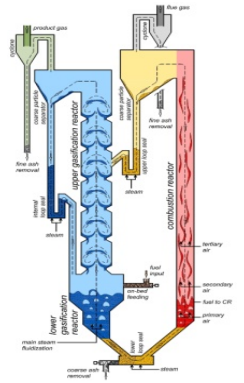
Process- and technology development



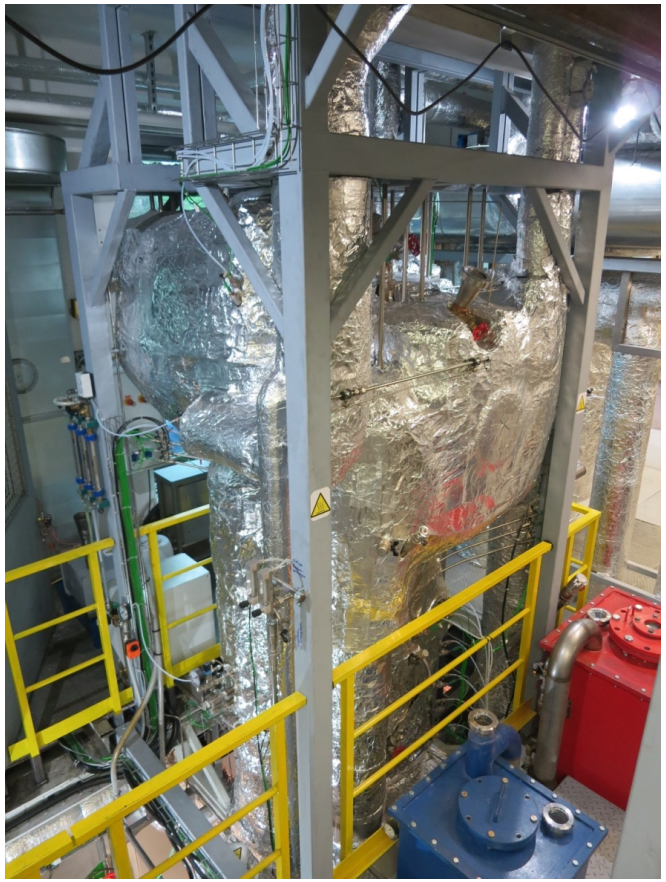
concept idea	cold flow model	pilot plant	demonstration plant	commercial plant

supported by process simulation

first calculations, mass- & energy balances	process development & data for basic engineering	support of start-up procedures and plant optimization

simulation-models | fuel analysis data | experimental results | plant parameters | operation-data

Development at lab-scale aiming at fuel flexibility



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Production of electricity & heat at industrial-scale

Replacement of high quality wood chips

SNG-Production: From lab-scale to industrial-scale

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Production of green fuels and chemicals at lab-scale

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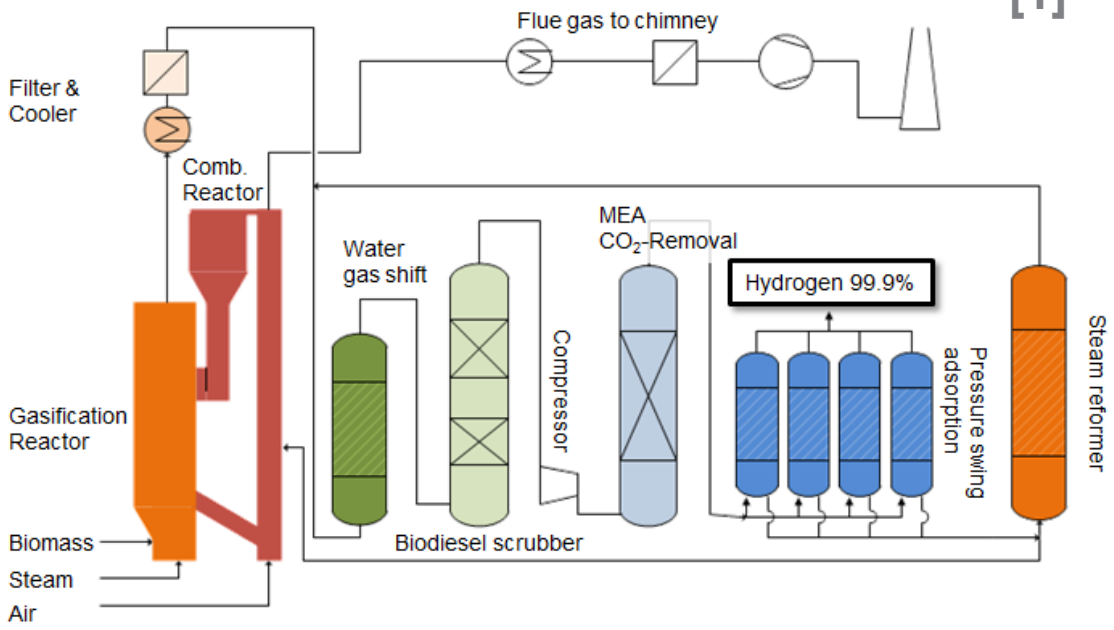
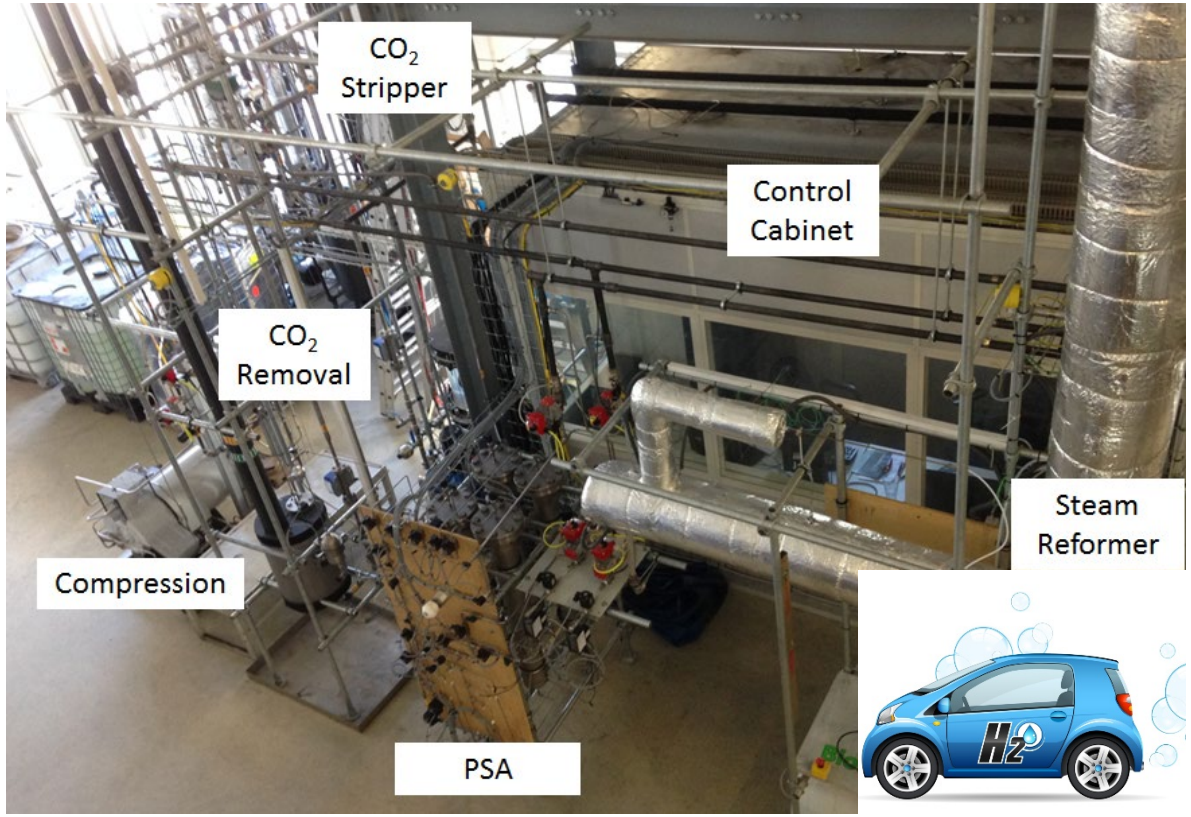
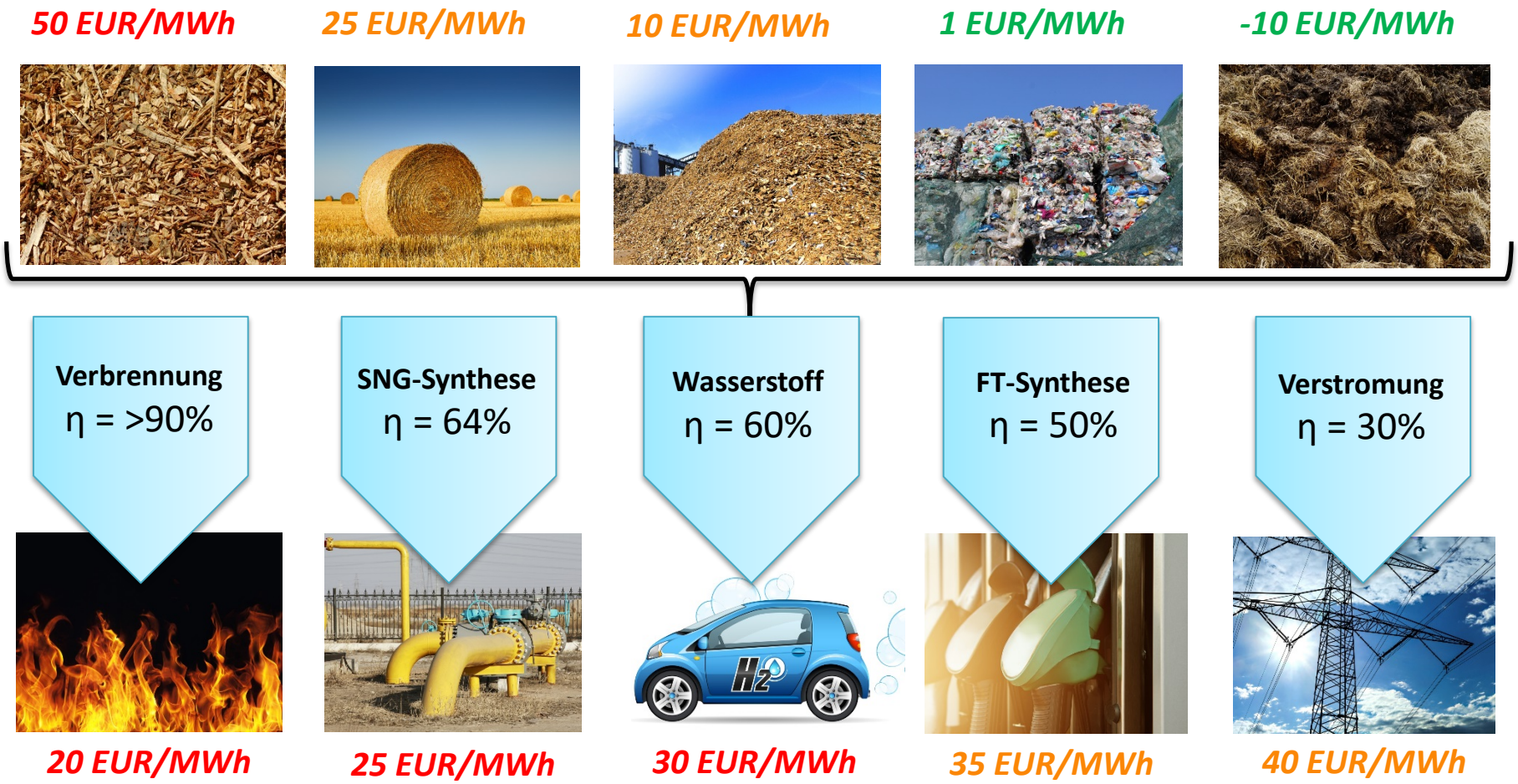
Production of pure hydrogen at lab-scale

[1]





Economic view and expected efficiencies



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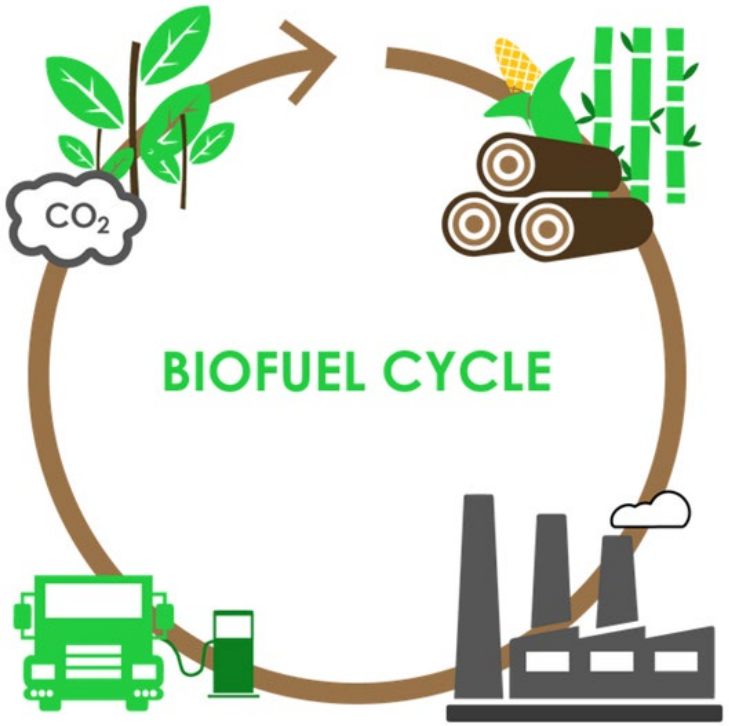
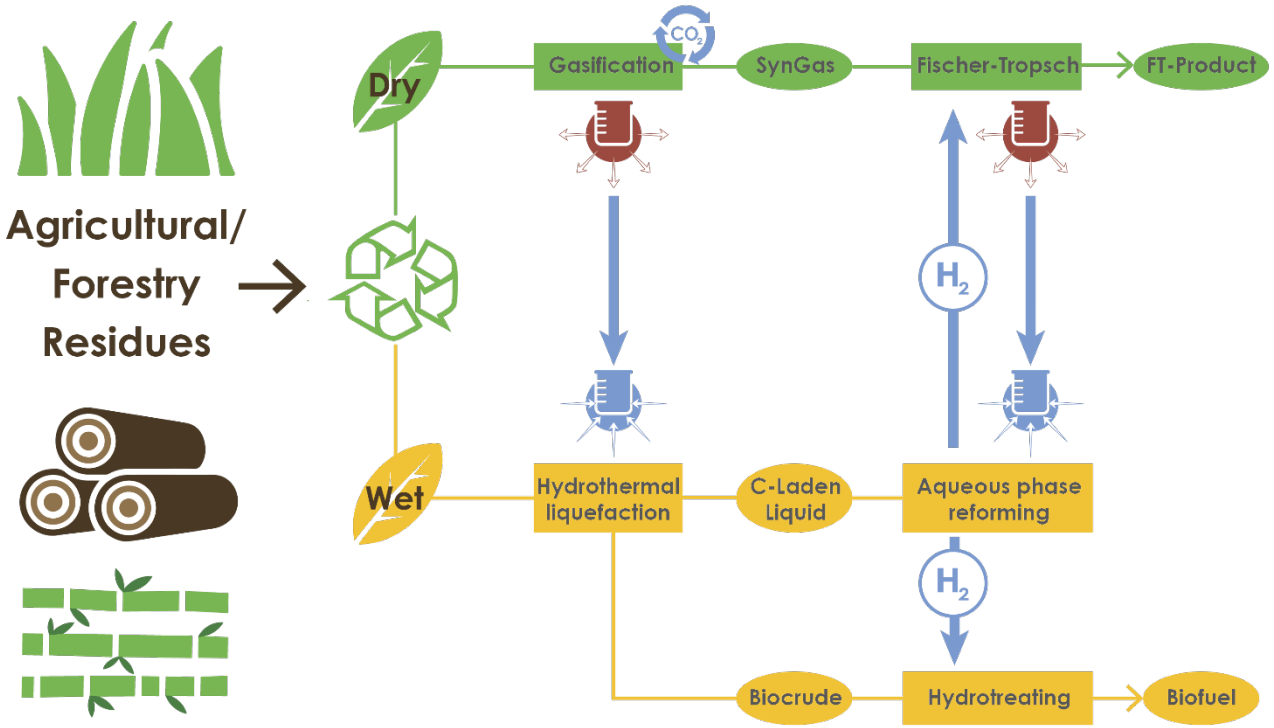
Heat to Fuel





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www.heattofuel.eu

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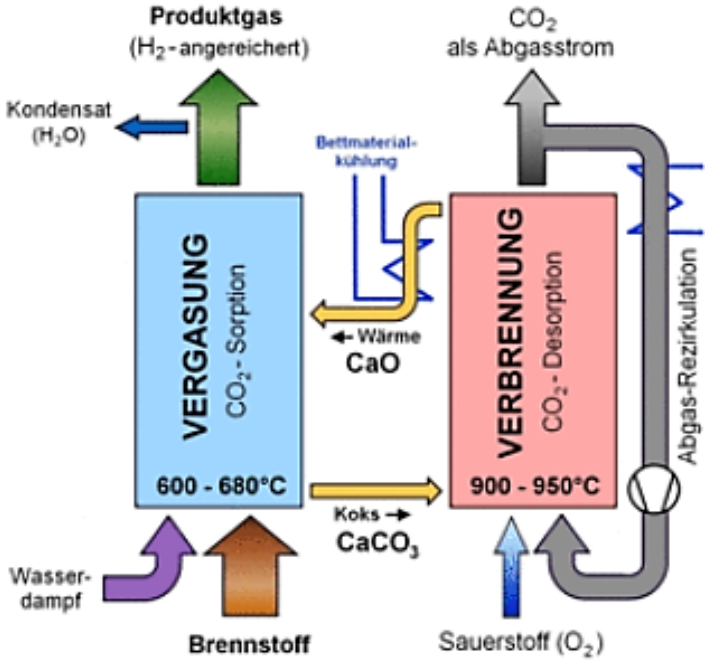
Renewable Steel Gas

voestalpine
EINEN SCHRITT VORAUS.



- Gas supply for energy intensive industry

Conclusions & Outlook

- A broad range of technological approaches already available to reach the goals of Paris Agreement.
- Furthermore, biomass conversion technology offers suitable interfaces for a coupling with other forms of renewable energy such as sun-, wind- or water-power.
- The current political and economical framework so far is not sufficient to enable the technology-implementation with the desired impact and at a relevant speed.
- Quick accelaration of activities is necessary based on a cooperation between public- and private sector.

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